MASTER OF SCIENCE
IN
PHYSICAL OCEANOGRAPHY

TEN YEARS OF HYDROGRAPHIC VARIABILITY OFF THE CENTRAL CALIFORNIA COAST DURING THE UPWELLING SEASON

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Analysis of mean conditions and variability during the upwelling season off central California was performed on data sets of buoy and shoreline surface measurements and conductivity, temperature, and depth (CTD) data from ten annual National Marine Fisheries Service (NMFS) surveys (1987-1996). Climatologies of the surface conditions (alongshore wind, sea surface temperature (SST), sea surface salinity (SSS)) revealed that the height of the upwelling season occurred during May and June. Variability in the surface conditions was high both inter-annually and inter-seasonally with maximum equatorward wind, lowest SST, and highest SSS during the months of May and June. Ten-year climatologies of hydrographic conditions from CTD data (depth and salinity on density anomaly surfaces, and temperature, salinity, density at discrete depths) indicated complex circulation patterns and water mass properties. The nearshore region contained relatively dense, upwelled water and isopycnal gradients conformed to local bathymetry. A robust upwelling filament off Pt. Reyes and three anticyclonic eddy-like features west of the shelf break appeared in the climatologies. Empirical orthogonal function (EOF) analysis of the subsurface variability confirmed the presence of the prominent features that appeared in the climatologies. The geophysical signals of the first three EOF-amplitude pairs represent a cross-shore mean upwelling pattern, an alongshore pattern caused by spatial variations in wind and gradients of water mass characteristics, and a filament-eddy resolving pattern, respectively.

KEYWORDS: Upwelling, Filaments, Eddies, Mesoscale Circulation, Empirical Orthogonal Functions

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